Postings: from the Desk of Jim Brodrick

As CALiPER testing has found, manufacturer claims about LED lighting products are often inaccurate. This is especially true for replacement lamp equivalency claims – whether because of an excess of enthusiasm on the part of manufacturers, or because they haven't yet figured out a good way to measure and convey equivalency. This means that, while some manufacturers are making accurate representations, there's a good chance that an LED replacement product whose label says it's the equivalent of a 60W incandescent bulb may only be emitting as much light as a 20W or 40W bulb. This sort of discrepancy could lead to a whole lot of disappointed consumers, who may erroneously conclude that all LED luminaires are just too dim compared to their conventional counterparts, or that SSL technology itself is not ready yet.

Often this problem arises when a manufacturer mistakenly presents LED device data as luminaire data and overlooks the thermal effects of steady-state operation, or the other components – such as the driver, heat sink, and optics – that can affect light output. What's more, in order to get true apples-to-apples comparisons, one has to take into consideration any other factors that might come into play. For example, for task lighting applications the directionality of LEDs can result in better illumination of target areas from LED luminaires than from their conventional counterparts, even at comparable lumen levels – so that an LED luminaire that produces 500 lumens might provide better illumination than, say, an incandescent light that produces 800 lumens. Conversely, some LED products intended for ambient room lighting base equivalency claims on light levels measured directly beneath the light fixture, leaving the rest of the room in the dark.

Why are equivalency statements for LED replacement products so important? To determine a lamp's light output, people traditionally look at wattage, which is a measure of the electric power required to operate at rated voltage. This approach works okay with

incandescent lamps, which generally show a strong relationship between wattage and light output (e.g., a 60W incandescent bulb yields less light than a 75W). But when it comes to more efficient lighting technologies, such as SSL and CFL, or making comparisons between technologies, it's preferable to look at the lumen output – at least, for the majority of replacement lamps, including the omnidirectional ones that people everywhere are familiar with. In any case, relying on wattage can be misleading. Since LED products and CFLs produce light more efficiently than conventional lighting, lower wattage doesn't mean they emit less light. The wattage needed to attain a given light output can vary considerably across these energy-efficient technologies – which means that when it comes to useful light, what matters is what's coming out (lumens), not what's going in (watts).

The habit of thinking about light bulbs in terms of their wattage is deeply entwined in our incandescent roots and will be hard to shake – in much the same way that we still use horsepower to describe the power of automobile engines because the early cars replaced wagons that were pulled by horses. We rely on comparisons with the familiar to help us understand things that are new to us.

But with the Energy Independence and Security Act of 2007 pushing for more energy-efficient lighting options by calling for the phase-out of low-efficiency incandescent lamps, *it's clearly time to start shifting the emphasis from watts to lumens*, and to educate consumers accordingly. Otherwise, in a few more years there are going to be an awful lot of confused people wandering around the aisles of stores looking for the 40W, 60W, 75W, and 100W lamps they've been used to, and scratching their heads trying to make sense of the high-efficiency lamps they find instead. Their confusion could be so great as to cause a certain amount of market dislocation. And if every manufacturer has its own way of explaining things to the consumer, it will only make things worse by creating a situation akin to the Tower of Babel.

What's clearly needed is some kind of coordinated effort to reeducate the consumer. And in fact there are already steps being taken to encourage a change in emphasis. As I mentioned in a *Posting* in December, the Federal Trade Commission recently proposed that the packaging for all medium screw base lamps

(incandescent, CFL, and LED) be required to display light output in lumens on the front panel, along with energy cost, while wattage would move to the side or rear. The idea, based in large part on consumer research, is that making lumens more prominent and wattage less so will help get people to focus on lumens rather than watts as a measure of light output.

Wattage is still an important metric, but as an indication of energy consumption. For the light output of the omnidirectional lamps that consumers everywhere are so familiar with, we should use lumens. We're headed in that direction, but we'll need to all work together to get there.

As always, if you have questions or comments, you can reach me at postings@lightingfacts.com.